Form Factor, Cases, and Power Supplies

IT Essentials Chapter 1

Computer Case and Form Factors

- Form Factor
  - Describes the size, shape, and general makeup of a hardware component
  - Must match
    - Motherboard
    - Power supply
    - Case

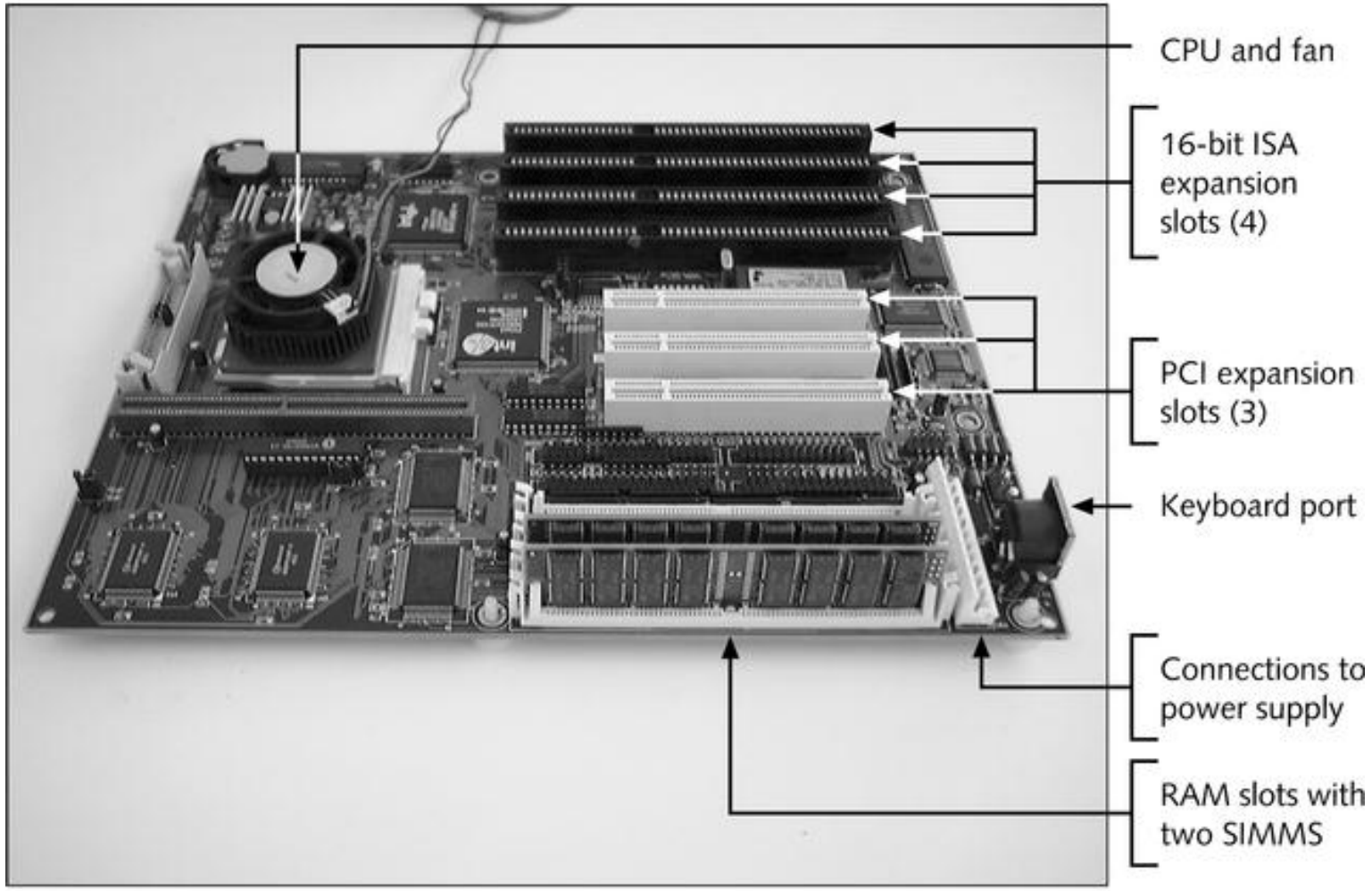
Case, Power Supply, and Motherboard Form Factors

Form Factors	
AT	Advanced Technology
ATX	Advanced Technology Extended
Mini-ATX	Smaller footprint of Advanced Technology Extended
Micro-ATX	Smaller footprint of Advanced Technology Extended
LPX	Low-Profile Extended
NLX	New Low-Profile Extended
BTX	Balanced technology Extended

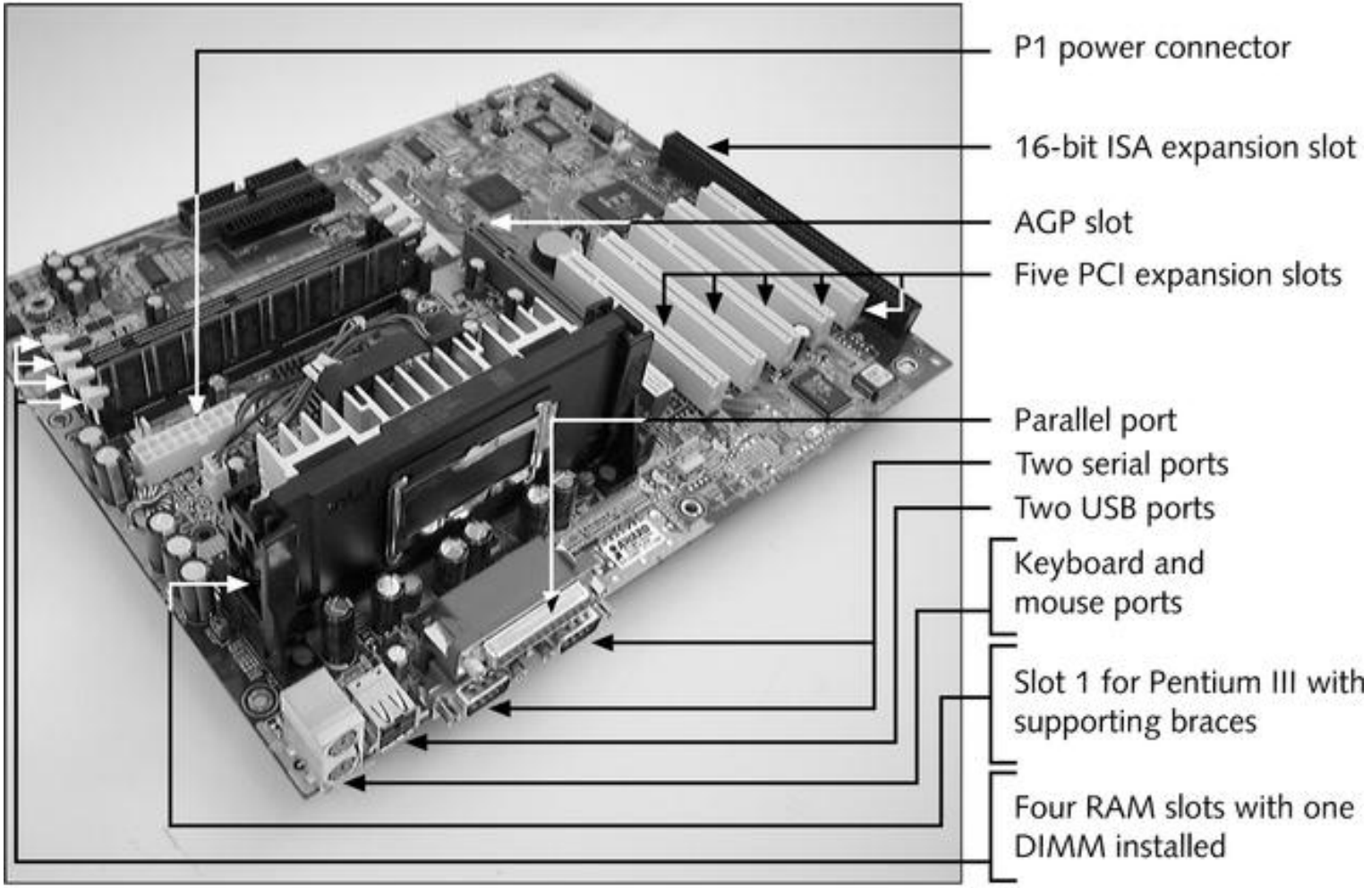
How can you tell?

- Power connector(s)
  - P8 & P9
  - 20 or 24 keyed connector
  - Additional 12v power (4-8 pins)
- Keyboard connector
  - DIN
  - PS/2 or mini-DIN
- I/O ports
- Size of motherboard

AT Form Factor

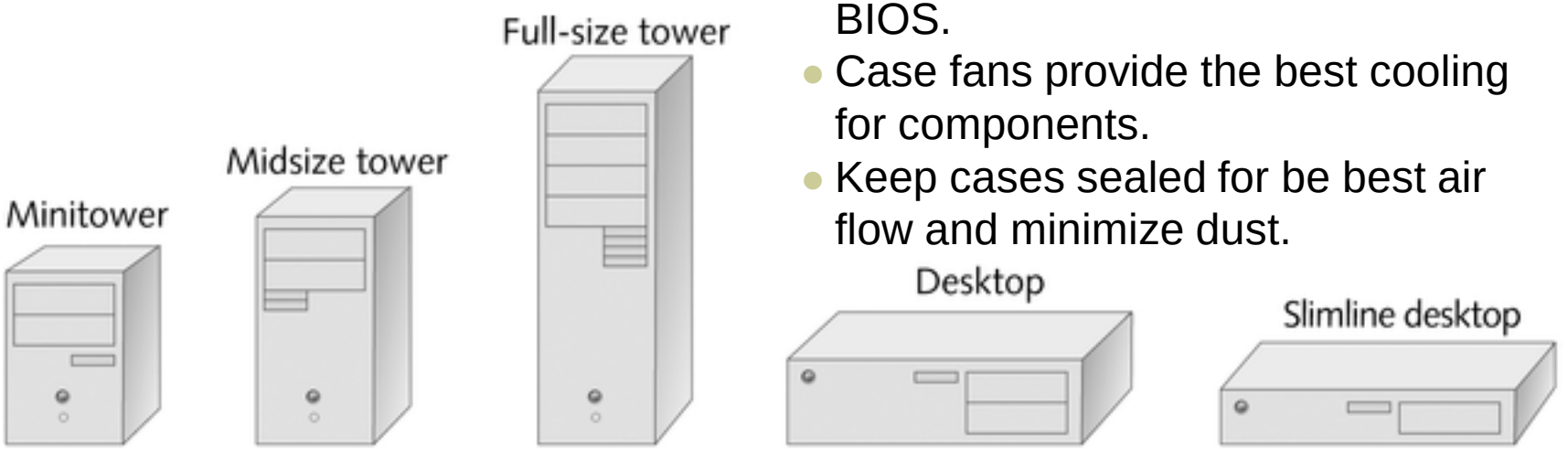


ATX Form Factor



Types of Cases

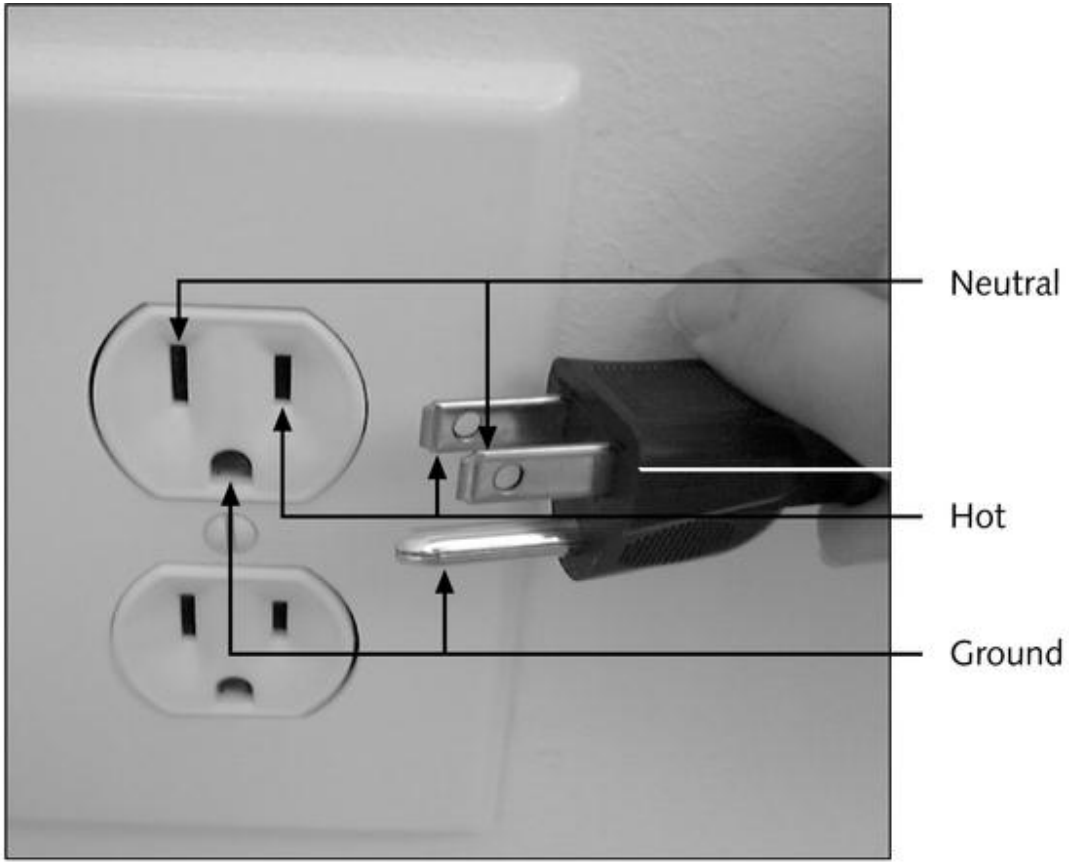
- Some cases have a Intrusion detection switch activated from the BIOS.
- Case fans provide the best cooling for components.
- Keep cases sealed for be best air flow and minimize dust.



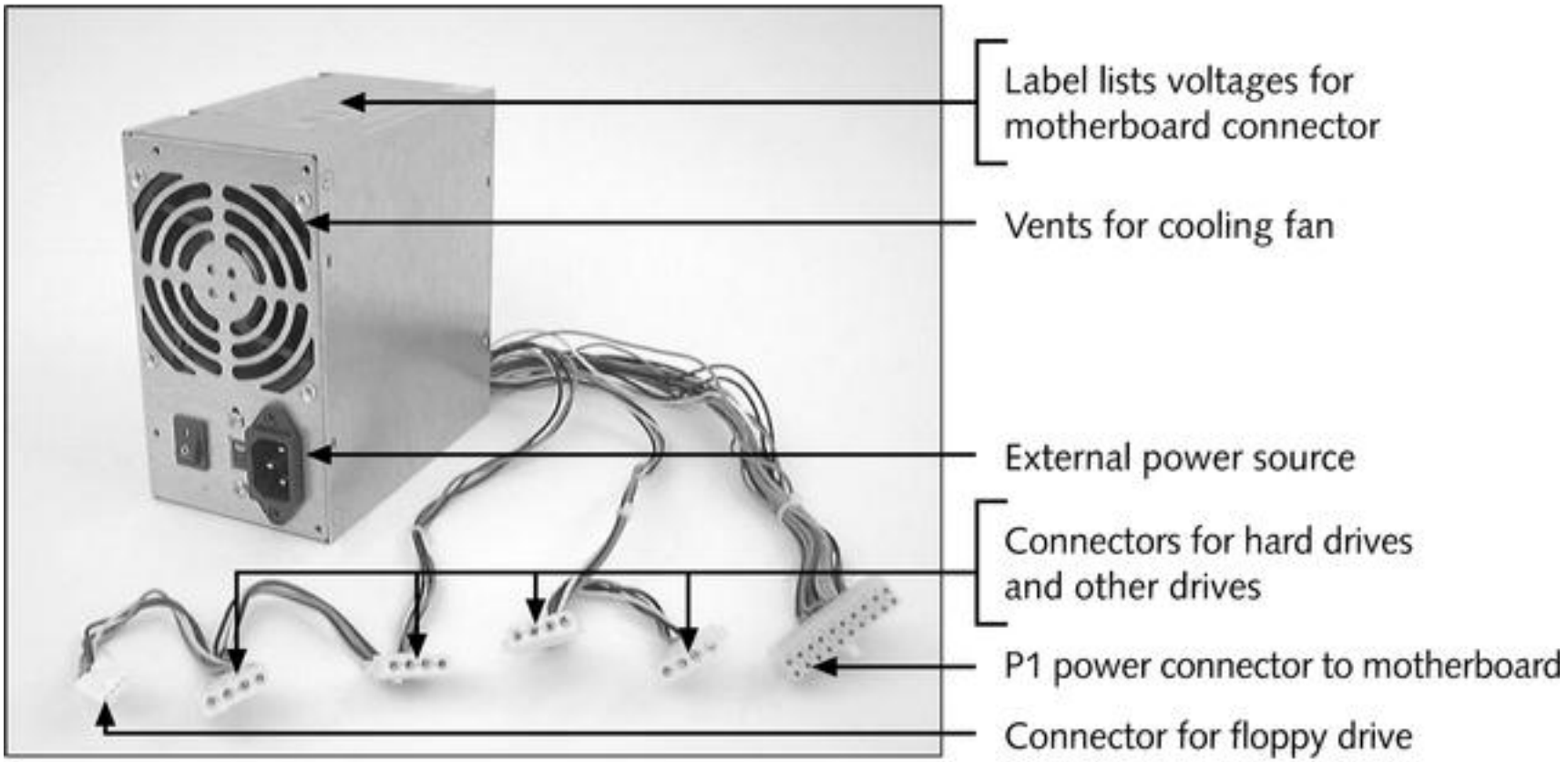
AC and DC

- AC (alternating current)
  - Cycles back and forth rather than traveling in only one direction
  - Most economical way to transmit electricity
- DC (direct current)
  - Travels in only one direction
  - Type of current required by most electronic devices, including computers
  - Computer power supplies function as both a transformer and a rectifier

Hot, Neutral, and Ground



Computer Power Supply



Computer Power Supply

- NEVER open the power supply case.
- Check the power switch is on.
- Check the voltage selector is correct.
- Blinking light indicated under voltage.

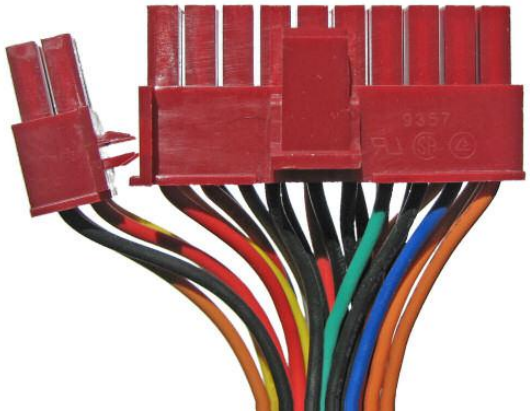
Computer Power Supply

- Power supplies may be internal or external.
  - Laptops are external AC adaptors.
  - Most desktops are internal.
  - Some are servers have external.

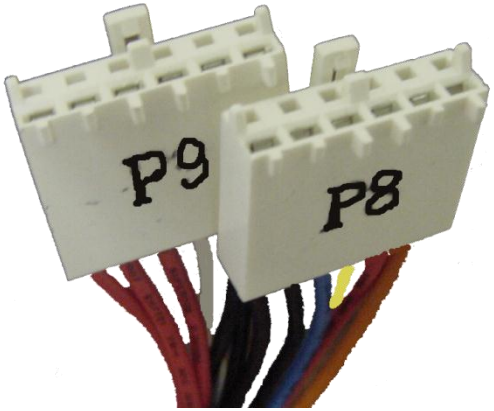
Power Connectors

Berg

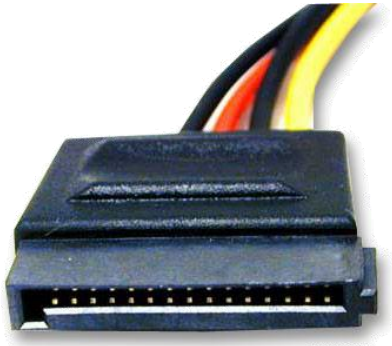
Molex



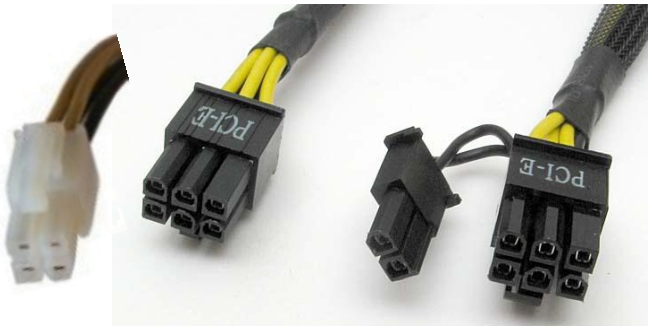
20 or 24 pin connector



AT or P8/P9 connector



SATA connector



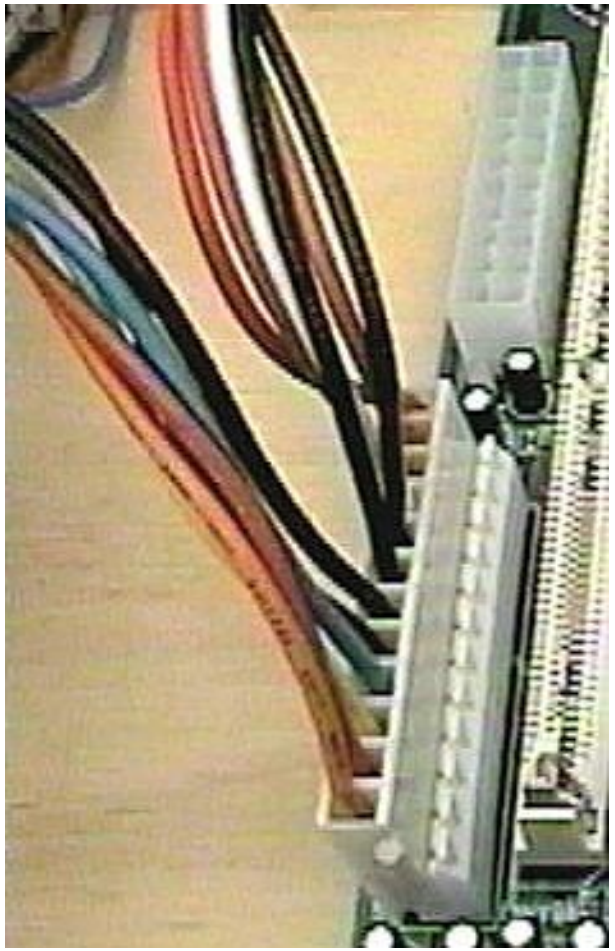
4, 6, or 8 pin connector

Main Power Connector

- AT – 2) 6 pin straight connectors
- ATX – 1) 20 or 24 pin keyed connector
  - Power supplies over 400 watts usually have 24 pins.
  - 4 extra pins used for dual core and up processors.
- You can buy 20 to 24 OR 24 to 20 pin adapters.

Warning

DO NOT switch the P8/P9 connectors!—Although they look alike, the voltage levels of each plug are different. Reversing them can cause severe damage.



Measuring the Voltage of a Power Supply

- Use a multimeter
  - Before using, tell it three things
    - Whether to measure voltage, current, or resistance
    - Whether the current is AC or DC
    - What range of values it should expect
  - How to measure voltage
  - How to measure current
  - How to measure continuity

Wire Colors

Voltage	Wire Color	Use	Power Supply AT	Power Supply ATX	Acceptable Range
+12V	Yellow	Disk drive motors, fans, cooling devices, and the system bus slots	*	*	+10.8 to +13.2
-12V	Blue	Some types of serial port circuits and early programmable read only memory (PROM)	*	*	-10.8 to -13.2
+3.3V	Orange	Most newer CPUs, some types of system memory, and AGP video cards		*	+3.1 to +3.5
+5V	Red	Motherboard, Baby AT and earlier CPUs, and many motherboard components	*	*	+4.5 to +5.5
-5V	White	ISA bus cards and early PROMS	*	*	-4.5 to -5.5
0V	Black	Ground -Used to complete circuits with the other voltages	*	*	

Measures of Electricity

Unit	Definition	An Example as Applied to a Computer
Volts (measures potential difference)	Abbreviated as V (for example, 110 V). Volts are measured by finding the potential difference between the electrical charges on either side of an electrical device in an electrical system.	An AT power supply supplies four separate voltages: +12 V, -12 V, +5 V, -5 V. An ATX power supply supplies these and also +3.3 V.
Amps or amperes (measures electrical current	Abbreviated as A (for example, 1.5 A) Amps are measured by placing an ammeter in the flow of current and measuring that current.	A 17-inch monitor requires less than 2A to operate. A small laser printer uses about 3A. A CD-ROM drive uses about .3A.

Measures of Electricity

To help you understand, imagine water flowing through a pipe:

- The movement of the water is like the flow of the electricity; this movement is called the current.
- The volume or force of water that flows through the pipe is like the volume of electricity through a conductor; the volume or force is measured in volts.
- The rate or speed of the water flowing through the pipe is like the rate of the electricity flowing through a conductor; the rate or speed is measured in amps.

Wattage

- Total amount of power needed to operate an electrical device
- Measured in watts
- Calculated by multiplying volts by amps in a system (W = V x A)
- In the US, AC currents come out of the outlet at 110V @ 60hz.

Introduction to Troubleshooting

- Categories of problems
  - Problems that prevent the PC from booting
  - Problems that occur after a successful boot
- Learn as much as you can by asking questions of the user

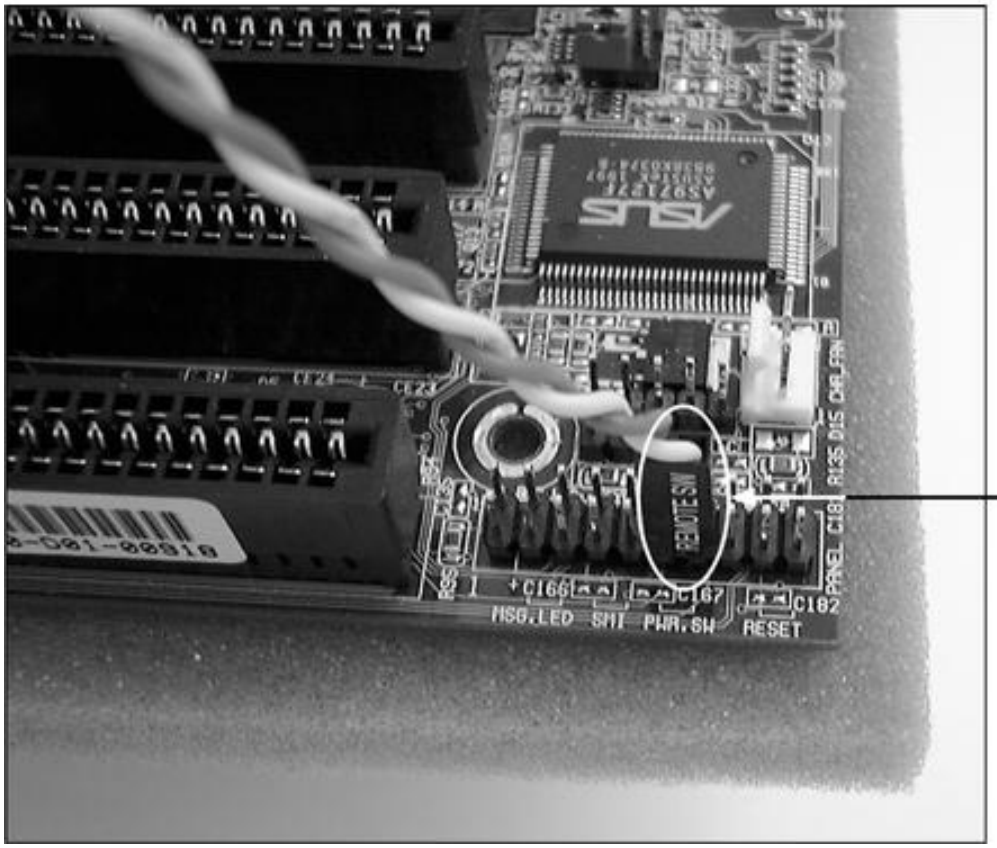
Troubleshooting the Power System

- Troubleshooting the power supply itself
- Troubleshooting the power supply fan
- Power problems with the motherboard
- Overheating

Troubleshooting the Power System: Guidelines and Questions

- Any burnt parts or odors?
- Everything connected and turned on? Loose cable connections? Computer plugged in?
- All switches turned on? Computer? Monitor? Surge protector? UPS? Separate circuit breaker? Wall outlet good?
- If fan is not running, turn off computer: Connections to power supply secure? Cards securely seated?

Troubleshooting the Power System



For an ATX power supply, the remote switch wire must be connected to the motherboard before power will come on.